

FREE

DESIGN, DEVELOPMENT AND DELIVERY OF
75VA AND 100VA INTEGRATED STATIC INVERTERS

MONTHLY REPORT, NUMBER 18

OCTOBER 1966

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SECTION II

TECHNICAL DISCUSSION

A. Progress Report for Month of October, 1966

1. Summary

a. 75VA

The first production model inverter is almost complete. It has undergone all electrical evaluation tests with satisfactory results.

Printed circuit boards for the series 53 Johnson counter circuitry have been fabricated and evaluated.

Twenty-four L-163's and four L-164's have been built this month.

In order to complete requirements for \div 256 and \div 10 arrays, additional material has been processed. A sufficient number of arrays of these types has now been assembled and tested to satisfy requirements, provided that the packaged devices survive mechanical testing.

Johnson counter material, incorporating a changed oxide removal mask, has been processed. The first lot of this material is presently being evaluated. Additional lots are in process.

b. 100VA

No effort was expended in the area of circuit design.

Masks for the 100VA devices have been received, but little work has been devoted to this contract because of the priority given to the 75VA contract.

2. Progress Report on Subsections

a. System

(1) 75VA

The first production model is almost complete. The only items remaining uncompleted are potting of the output plugs, ruggedizing the low level circuitry printed circuit board, mounting the thermistor and final mounting of the Johnson counter printed circuit board.

Electrical evaluation is also almost completed. It has operated satisfactorily at the maximum and minimum ambient temperatures under all load conditions.

Figure 1 is the combined schematic and wiring diagram of the production model inverters. The parts list is shown in Table 1. The changes since last report are: R36 changed to 6653 and 23 and R29 to be selected for 2% tolerance.

Some photographs of the inverter are shown in Figures 2A and 2B.

b. Power Transistors

(1) 75VA

Twenty-four L-163's have been built this month. Problems with the thermal impedance measuring equipment have delayed complete electrical evaluation. Nine of these units meet all electrical specs except thermal impedance, which has not been evaluated.

Three L-163's which meet all electrical specs are now undergoing mechanical testing in QA. Sixteen good units are on hand which have been completely tested.

Four L-164's were built this month; two had gross defects and the other two are being evaluated. From the group built last month, one unit met all specs.

c. I/C Arrays

(1) 75VA

Sufficient ripple counter $\div 12$, $\div 10$ material has been processed and tested to satisfy requirements for these devices. Present efforts are totally concentrated on the Johnson counter array. The first lot had surface defects, which are presently being analyzed; however, two arrays were found which operated properly, though at high values of V_{CC} only. These are being assembled for further studies.

Additional material is presently being processed. The mask change for this design proved out most satisfactory, as expected.

B. Current Problems and Corrective Action

No problems.

C. Work to be Performed During Next Reporting Period

1. System

a. 75VA

(1) Complete fabrication and electrical evaluation of first production model inverter.

(2) Begin fabrication of second and third production model inverter.

b. 100VA

(1) Continue circuit design.

2. Power Transistors

a. 75VA

(1) A satisfactory method to determine the power handling capabilities of the L-163's will be developed. Sufficient power devices to complete the contract should be built in November.

b. 100VA

(1) As time permits, diffusion runs on the PNP devices will be started.

3. I/C Arrays

a. 75VA

(1) Complete processing of Johnson counter material and complete delivery of these arrays.

PARTS LIST - 75VA STATIC INVERTER

TABLE 1

<u>Component Designation</u>	<u>Description of Components</u>	<u>Manufacturer</u>	<u>Comments</u>
Q1-Q7	L-163, Dual Power NPN Darlington Transistor, 6 Pin Stud Package	TI	Developmental Item
Q8	L-164, Dual Power NPN-PNP Transistor, 6 Pin Stud Package	TI	Developmental Item
G1	G1, Isolated Common Terminal	TI	Developmental Item
D1	1N3890, 100V, 12 Amp Fast Recovery Rectifier, DO-4 Type Package	TI	
C1-C6	K1G333K-D2, .033 uf, 100 VDC, $\pm 10\%$ Polycarbonate Capacitor	Elpac	
C7-C8	186P33491T15, .33 uf, 100 VDC, $\pm 10\%$ Metal Clad Capacitor	Sprague	
X1	G-663 Thermistor (NASA Part #50M10346)	FEIC	
M1	PA-1, Potted DC Filter Capacitor Assembly C9 202D108X0050A5, 50 VDC, 1000uf $\pm 20\%$, Sprague Tantalum Capacitor C10 202D357X9150A5, 150 VDC, 350 uf $\pm 10\%$, Sprague Tantalum Capacitor C11 202D198X9015A2, 15 VDC, 1900 uf $\pm 10\%$, Sprague Tantalum Capacitor	TI	Developmental Item

<u>Component Designation</u>	<u>Description of Components</u>	<u>Manufacturer</u>	<u>Comments</u>
M2, M3, M4	PA-2, Potted Power Transformer Assembly Two Transformers: Cores-Magnetics 52026-2S Tape Wound Toroids, PRL. 180T, SEC. NS1 = 120T, NS2 = 90T, NS3 = 30T. All wire is #23 H.F.	TI	Developmental Item
M5, M6, M7	PA-3, Potted Inductor Assembly One AC Choke 1mh, 63 Turns, #18 H.F. Core: Magnetics 55927-M4 Powdered Iron Toroid One Voltage Sense Transformer Core: Magnetics 52176-2A, Tape Wound Toroid, PRL. 900T #36 H.F., SEC. 200T, #34 X.M.	TI	Developmental Item
M8	One Current Sense Transformer Core: Magnetics 52000-2A Tape Wound Toroid PRL. 2T #16 H.F., SEC. 500T, #32 X F PA-4, Potted DC Choke Assembly L-5 \approx .265mh, 41 Turns, #13 H.F. Core: Arnold W110168-3 Powdered Iron Toroid L-4 \approx .8mh, 54 Turns, #13 H M Core: Arnold W-108281-3 Powdered Iron Toroid	TI	Developmental Item
M9	PA-5, Potted AC Filter Capacitor Assembly 3 Capacitors: C1, C2, C3. K1G205J-H1, 2uf, 100VDC, \pm 5% Elpac Polycarbonate Capacitors	TI	Developmental Item

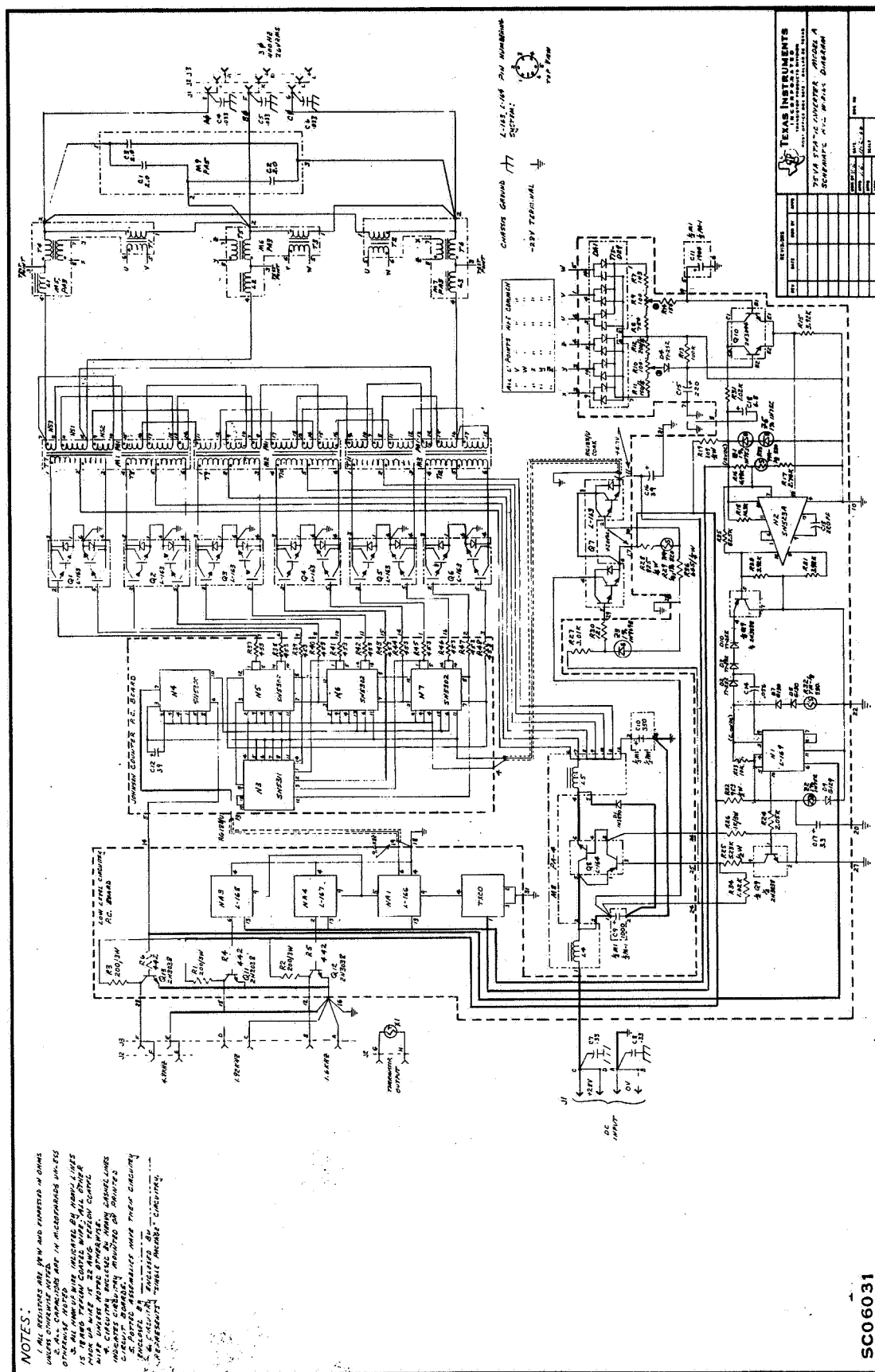
Low Level Circuitry P & B Order

Component Designation	Description of Components	Manufacturer	Comments
TXCO	2.4576 mc Temperature Compensated Crystal Oscillator	Bendix	Developmental Item
1	L-166, Integrated Circuit 8 Stage Ripple Counter Array	TI	Developmental Item
NA3	L-168, Integrated Circuit ÷ 10 Multi-Mile Array	TI	Developmental Item
NA4	L-167, Integrated Circuit ÷ 12 Multi-Mile Array	TI	Developmental Item
N1	L-169, Integrated Circuit Variable Duty Cycle One-Shot; Mask Modification of SN5380	TI	Developmental Item
NZ	SNB23A, Integrated Circuit Differential Amplifier		
Q9	2N3838, Dual PNP-NPN Transistors in TO-89 Package		
Q10	2N3044, Dual NPN Transistors in TO-89 Package	TI	
Q11-Q13	2N3038, Transistors in TO-50 Tube Package	TI	
C16	3CM3B6BP010C2, 39pf, 10 uPC, ±10%, Tantalum capacitor	TI	
C13	3E106M241M, 220pf, 200 VDC, ±20%, Ceramic capacitor	ics	
C14	K6G563G-1, .056uf, ≤80 VDC, ±2%, Polycarbonate Capacitor		
C15	SCM227HP01002, 220uf, 10 C, ±10%, Tantalum Capacitor		
C17	SCM335FP015A4, 3 3uf, 15 VDC, ±20%, Tantalum Capacitor		

<u>Component Designation</u>	<u>Description of Components</u>	<u>Manufacturer</u>	<u>Comments</u>
C18	SCM6B5BP03502 6 Buf $\pm 5VDC \pm 10\%$ Tantalum Capacitor	TI	
Z1	1%, 1N75M, 6.2V Breakdown Diode Moly/G Glass Package	TI	Selected from 1N753 family
Z2 Z5	1%, 1N752, 5.6V, Breakdown Diode Moly/G Glass Package	TI	Selected from 1N752 family
Z3	1N969B, 22V 2% Breakdown Diode, Moly/G Glass Package	TI	Selected from 1N969B family
D2, D3, D10 D4	TI-252, 50V, 40ma Diffused Silicon Mesa Diode, Micro/G Package	TI	
D7 D8	GL20 Separistor, Silicon Forward Conductance Diode, Moly/G Glass Package	TI	
D9	GL29 Separistor, Silicon Forward Conductance Diode, Moly/G Glass Package	TI	
D11	TI102B $\pm 0V$, Dual 10 Array, TO-18 Type Package	TI	
R1-R3	RW6HV201 200 Ω 3W Wirewound Resistor	Sprague	
R4-R6	CR-1/8 442 Ω 1/8W 1% Carbon Film Resistor	TI	
R7	CR-1/8 142 Ω 1/8W 1% Carbon Film Resistor	TI	
R8	CR-1/8, 750 Ω , 1/8W 1% Carbon Film Resistor	TI	
R9 R10	$\pm 260H-1-101$ 100 Ω , Trimpot	Bourns	

Component Designation	Description of Components	Manufacturer	Comments
R11	CR-1/4, 150Ω, 1/4W, 1%, Carbon Film Resistor	TI	
R12	CR-1/8 200Ω, 1/8W, 1% Carbon Film Resistor	TI	
R13	CR-1/8, 100K, 1/8W, 1%, Carbon Film Resistor	TI	
R14	CR-1/8, 150Ω, 1/8W, 1%, Carbon Film Resistor	TI	
R15, R20, R21	CR-1/8, 3.92K, 1/8W, 1%, Carbon Film Resistor	TI	
R16	CR-1/8 99K 1/8W 1% Carbon Film Resistor	TI	
R17	CR-1/8, Z 70K 1/8W, 1% Carbon Film Resistor	TI	
R18	CR-1/8, 14.3K, 1/8W, 1%, Carbon Film Resistor	TI	
R19	MC65 T 2 30HΩ, 1/2W 1% Metal Film Resistor	TI	
R22	MC65 T-Z, 953Ω 1/2W 1% Metal Film Resistor	TI	
R23	CR-1/8, 10K 1/8W, 1% Carbon Film Resistor	TI	
R24	CR-1/8, 2.05K, 1/8W, 1%, Carbon Film Resistor	TI	
R25	CR-1/2, 5.23K, 1/2W, 1%, Carbon Film Resistor	TI	
R26	RW6HV102, 1K 3W Wirewound Resistor	Sprague	
R27	CQ-1/8 3 01K 1/8W 1% Carbon Film Resistor	TI	
R28	CR-1/4, 825Ω, 1/4W, 1%, Carbon Film Resistor	TI	

<u>Component Designation</u>	<u>Description of Components</u>	<u>Manufacturer</u>	<u>Comments</u>
R29	820Ω, ±1%, TM-1/4, Resistor	TI	
R30	CR-1/8, 121Ω, 1/8W, 1%, Carbon Film Resistor	TI	
R31, R34	CR-1/8, 1.02K, 1/8W, 1%, Carbon Film Resistor	TI	
R32, R33	330Ω, ±5%, TM-1/8, Resistor	TI	
R35	CR-1/8, 82.5K, 1/8W, 1%, Carbon Film Resistor	TI	
R36	CR-1/8 634Ω, 1/8W, 1%, Carbon Film Resistor	TI	
<u>Johnson Counter & C Board</u>			
C12	SCM396BP010C2, 39uf, 10 VDC, ±10% Tantalum Capacitor	TI	
R37-R48	CR-1/8, 453Ω, 1/8W, 1%, Carbon Film Resistors	TI	
N3	SN5311 Dual 5 Input NAND Gate		
N4	SN5300 J-K Flip-Flop		
N5-N7	SN5302 Dual J-K Flip-Flops		



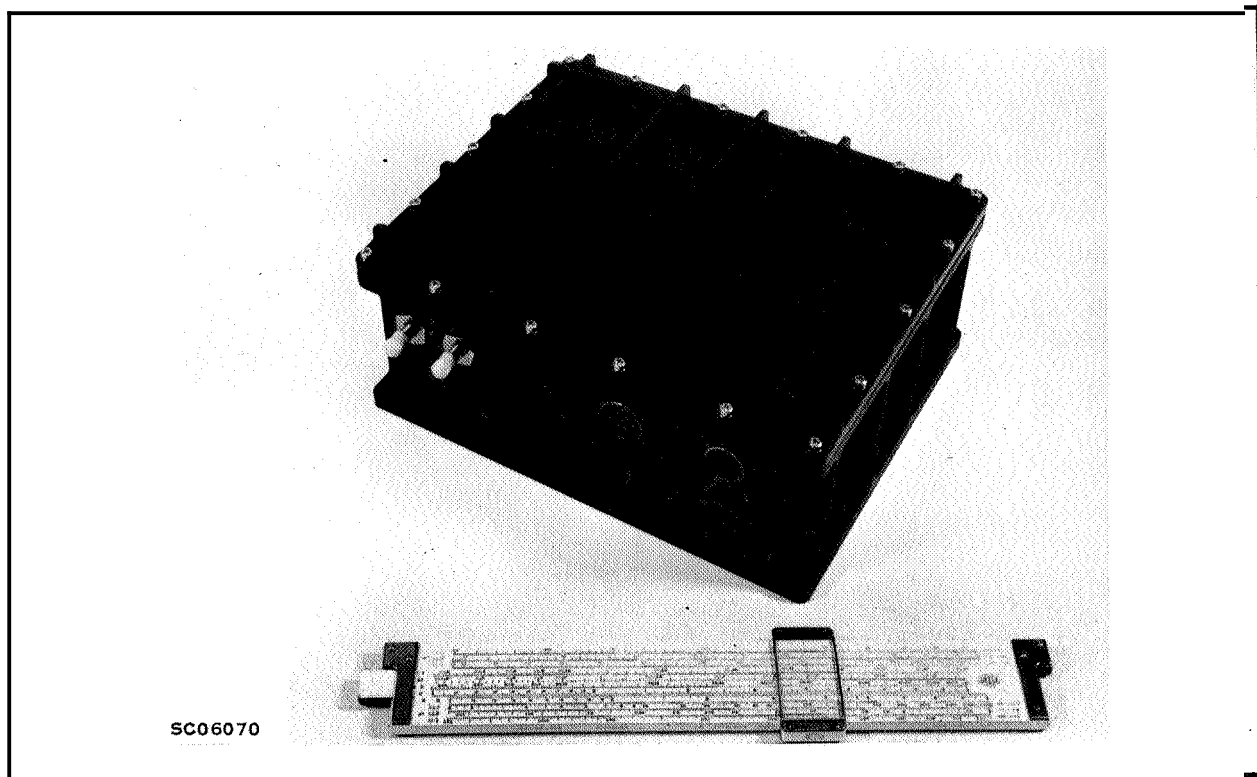


Figure 2-A. 75 VA Static Inverter

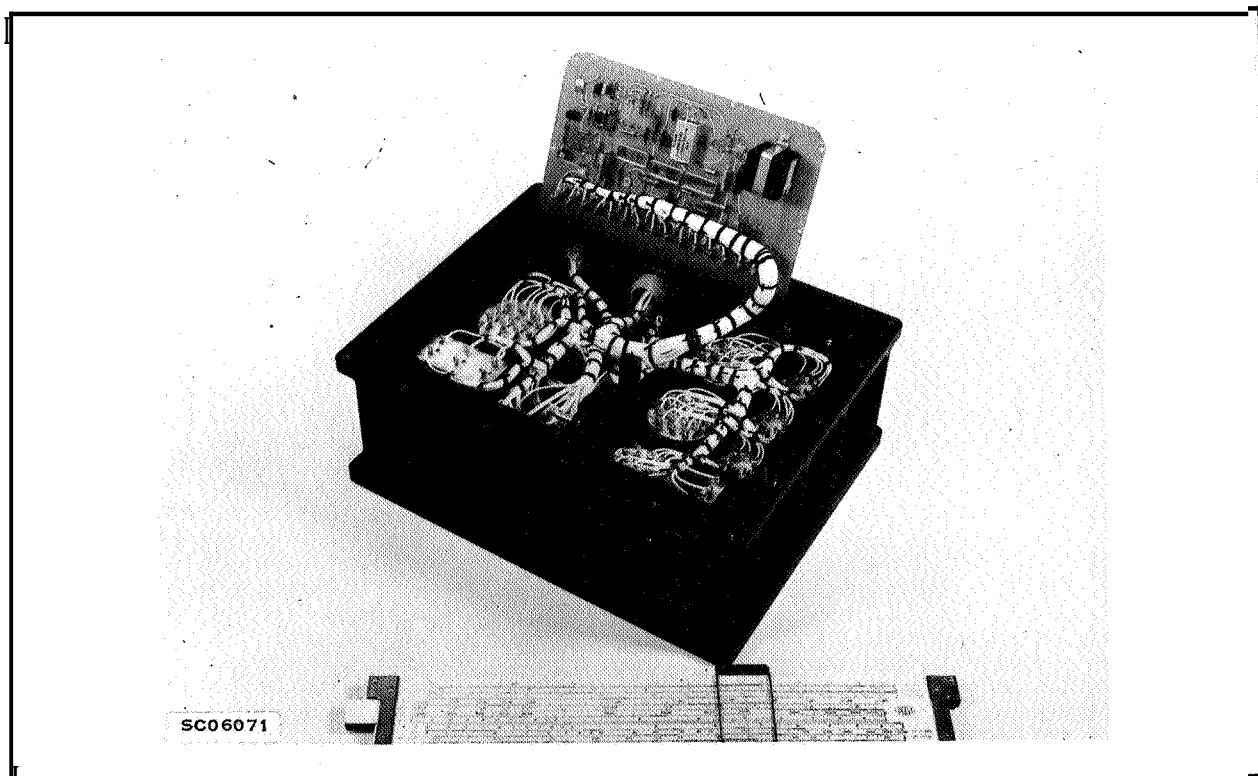


Figure 2-B. 75 VA Static Inverter, Internal View